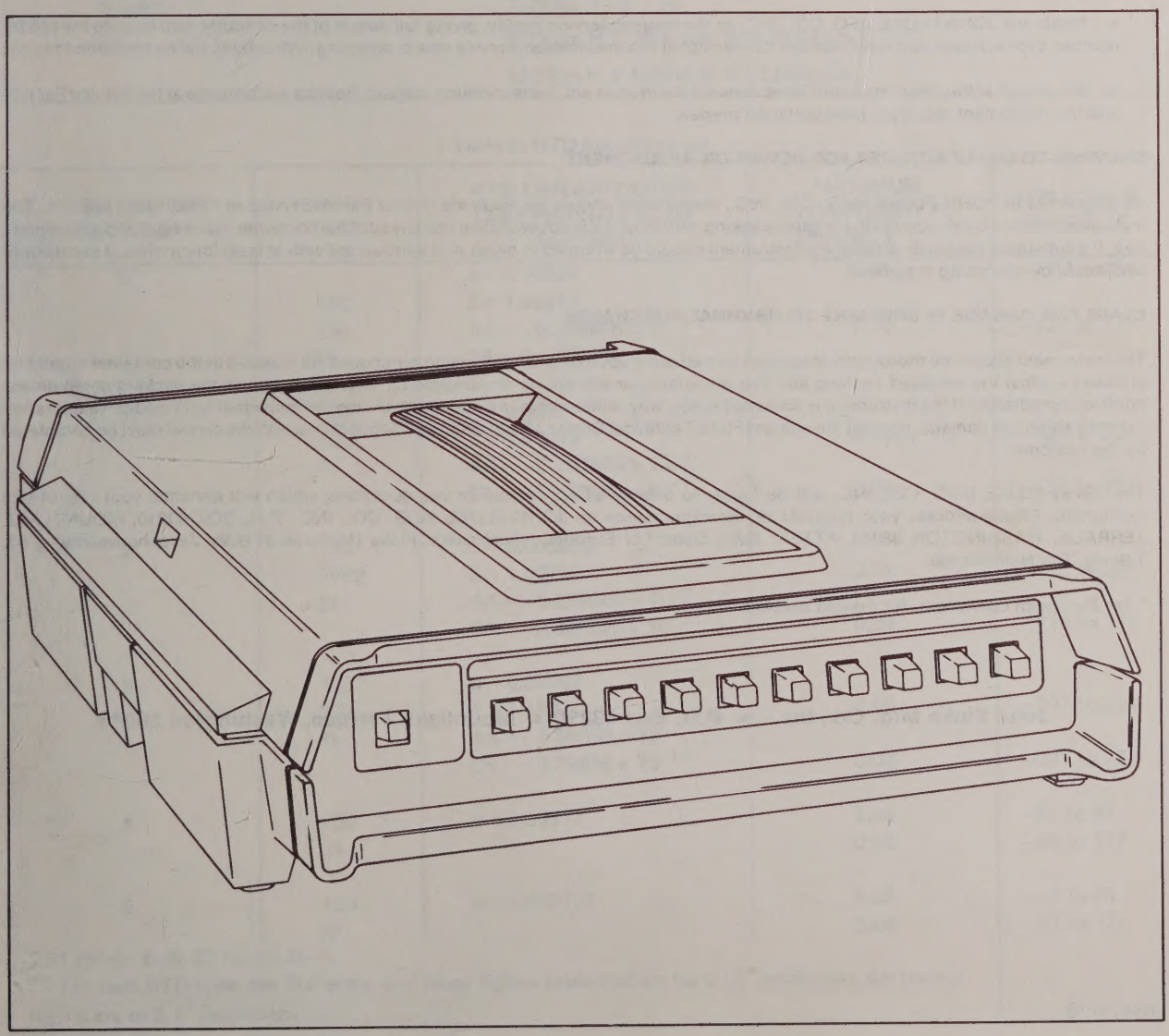
FLUKE®

Instruction Manual

Y2000

RTD Multipoint Selector



P/N 489237 6/78

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INTRODUCTION

The Model Y2000 RTD Multipoint Selector is a manually-switched device capable of selecting one of ten attached RTD inputs for monitoring by the 2180A Digital Thermometer. The Y2000 inputs are divided into two groups of five; a different type of RTD may be monitored by each group. Two or more Y2000's may be stacked in a serial configuration to allow for more than ten RTD inputs or for more than two RTD types.

SPECIFICATIONS

Specifications for the Y2000 RTD Multipoint Selector are presented in Table 1. RTD specifications are presented in Table 2.

Table 1. Y2000 RTD Multipoint Selector Specifications

The Y2000 does not degrade the accuracy or other characteristics of the 2180A. Each channel read will be identified by number when a digital printer is used with the 2180A (Option 21X0-002 installed).	
Number of Channels:	Ten, up to 100 with multiple Y2000's.
RTD Types Accomodated:	Six. See Table 2 for RTD Specifications.
RTD Types Selectable:	Two, five channels per type.
Power:	25 mW, supplied by 2180A.
Accessory Bus:	Rear panel receptacle plus 46 cm cable with connector.
Weight:	1.39 kg; 3 lbs. 1 oz.
Size:	5.72 cm H X 20.45 cm W X 32.64 cm D (2.25 in H X 8.05 in W X 12.85 in D)

Table 2. RTD Specifications

RTD SWITCH SETTING*	RTD TYPE	RTD LINEARIZATION COEFFICIENTS USED In 2180A	MAXIMUM CONFORMITY ERROR, ± °C**	APPLICABLE RANGE, °C
0		$\alpha = 0.00385$	0.01	–220 to 204
	100	$\delta = 1.49951$		
	385	$A4 = -0.759668 \times 10^{-4}$	0.06	–220 to 779
	Pt	$C4 = 0.463833 \times 10^{-13}$		
1	100	$\alpha = 0.00390$		
	390	$\delta = 1.53372$	0.06	–229 to 204
	Pt	$A4 = -0.259668 \times 10^{-4}$		
		$C4 = -0.902946 \times 10^{-12}$	0.06	–229 to 773
2	100	$\alpha = 0.003902$		
	3902	$\delta = 1.50283$	0.01	–218 to 204
	Pt	$A4 = -0.239668 \times 10^{-4}$		
		$C4 = -0.203695 \times 10^{-11}$	0.06	–218 to 771
3	100	$\alpha = 0.00392$		
	392	$\delta = 1.4807$	0.05	–237 to 204
	Pt	$A4 = -0.59668 \times 10^{-5}$		
		$C4 = -0.28695 \times 10^{-12}$	0.06	–237 to 767
4	100	$\alpha = 0.00617$	0.06	–60 to 93
	Ni		0.06	–60 to 177
5	120	$\alpha = 0.006721$	0.06	–57 to 93
	Ni		0.06	–57 to 177

* S1 for ch. 5–9, S2 for ch. 0–4.

** For each RTD type, the first error, and range figures presented are for 0.01° resolution; the second figures are of 0.1° resolution.

INSTALLATION

The Y2000 mates in PTI (Portable Test Instrument) piggy-back fashion with the 2180A Digital Thermometer and other accessories. Electrical connections are made with the Accessory Bus and with separate RTD inputs.

Use the following procedure when installing the Y2000 RTD Multipoint Selector:

NOTE

Insure that the ACCESSORY CABLE and the ACCESSORY CONNECTOR on the Y2000's rear panel are both disconnected before proceeding with installation.

1. On the bottom of the instrument, remove the four screws attaching the cover to the case bottom. Lift the top cover away.

2. If required for multiple Y2000 identification, remove appropriate BCD coding diodes located in the Main PCB's right rear corner (CR1-CR4). Refer to Channel Identification.

3. Attach the input RTD lines to the input connectors (TB0-TB9). Insure that these lines enter through either of the two rear panel access ports. Refer to Figure 1 for RTD connections involving 2, 3, or 4 wires. Generally, wires of the same color should be connected to same polarity terminals (–V and –S, or +V and +S). Consult instructions provided with the RTD for specific connection directions.

4. Position RTD type select switches (S1, S2) for the RTDs to be used. Use information presented in Table 3 when toggling segments of S2 (for channels 0-4) and S1 (for channels 5-9).

NOTE

Only two types of RTD's may be used with each Y2000 RTD Selector. All connections within a group (channels 0-4, or 5-9) must be made to the same type RTD.

5. Perform nulling Resistor Calibration (R4 -R13) for RTD(s) selected. Refer to CALIBRATION when adjusting nulling resistors.

6. Replace the top cover. Reattach top cover to bottom with the four screws.

7. Connect the permanently attached accessory cable to the next unit's inputs (2180A, Y2002, or Y2000).

CAUTION

If the Y2002 Alarms unit is used in conjunction with the Y2000 RTD Selector, the interconnecting order must be: 2180A-Y2002-Y2000 (refer to Figure 2).

8. On the 2180A Digital Thermometer, insure that the input switch (RTD Input Module) is toggled to setting 0 (all segments OFF).

9. Apply power to the 2180A.

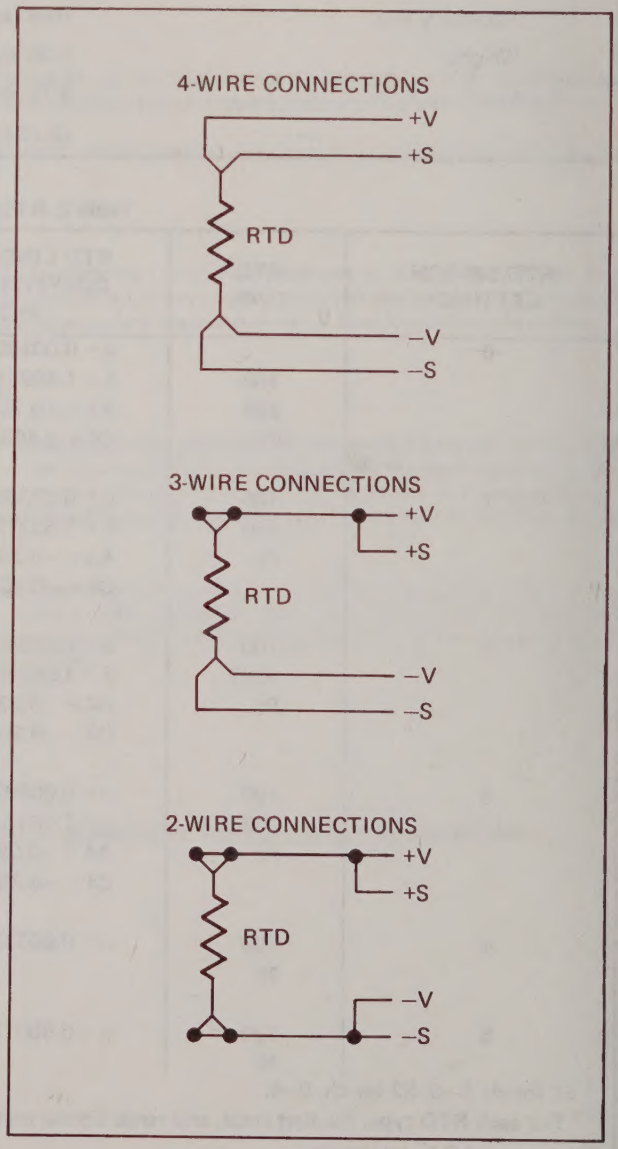


Figure 1. RTD Connections

Table 3. RTD Selection (S1, S2)

POS NO.	RTD TYPE	1	2	4	8
0	385 Pt, 100Ω	0	0	0	0
1	390 Pt, 100Ω	1	0	0	0
2	3902 Pt, 100Ω	0	1	0	0
3	392 Pt, 100Ω	1	1	0	0
4	100 Ohm Ni	0	0	1	0
5	120 Ohm Ni	1	0	1	0
6	---				
7	---				

Notes:
For switch segments 1, 2, 4 and 8: ON = 1, OFF = 0.
Toggle switch segments:
(Segment 8 is not used on the Y2000)

OPERATING FEATURES

The controls on the Y2000 front panel, as shown in Figure 3, consist of ten individual CHANNEL selectors (0 through 9) and an EXTENSION switch. Select EXTENSION when a channel in another Y2000 is to be used. The CHANNEL switches select the RTD desired to input temperature data to the 2180A Digital Thermometer. No more than one front panel switch may be selected at one time. Pressing any CHANNEL switch will disconnect any other switch already pressed; pressing EXTENSION will also disconnect any local CHANNEL already selected. Table 4 provides an explanation of other controls and connectors used on the Y2000 RTD Selector.

OPERATING NOTES

RTD Connections

Each RTD connection to the Y2000 is made on four screw-type terminals. Each of the ten channels contains two source voltage (–V, +V) and two sense voltage (–S, +S) terminals in one terminal block. The terminals, accessible when the Y2000's top cover is removed, are marked with polarity, function, and terminal block (TB) number; TB0-9 numbers correspond to channel numbers 0-9.

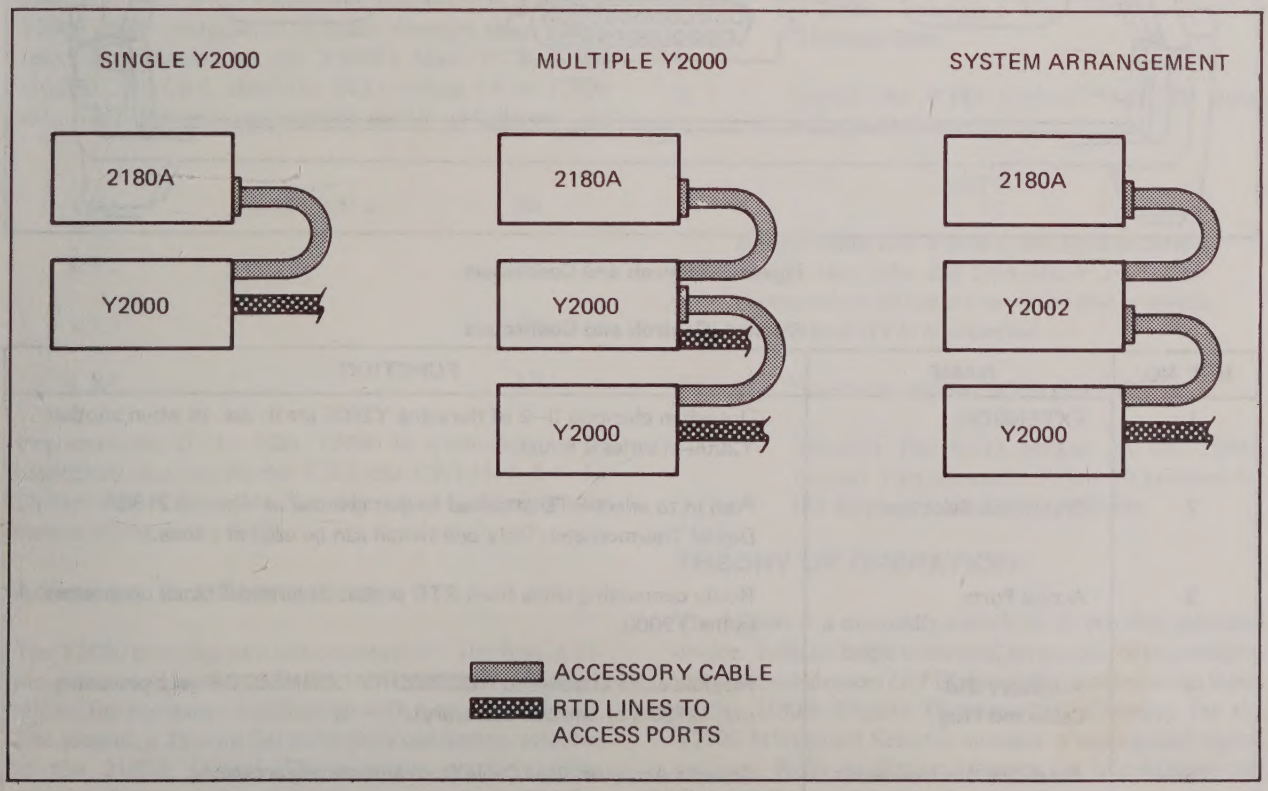


Figure 2. Accessory Bus Connections

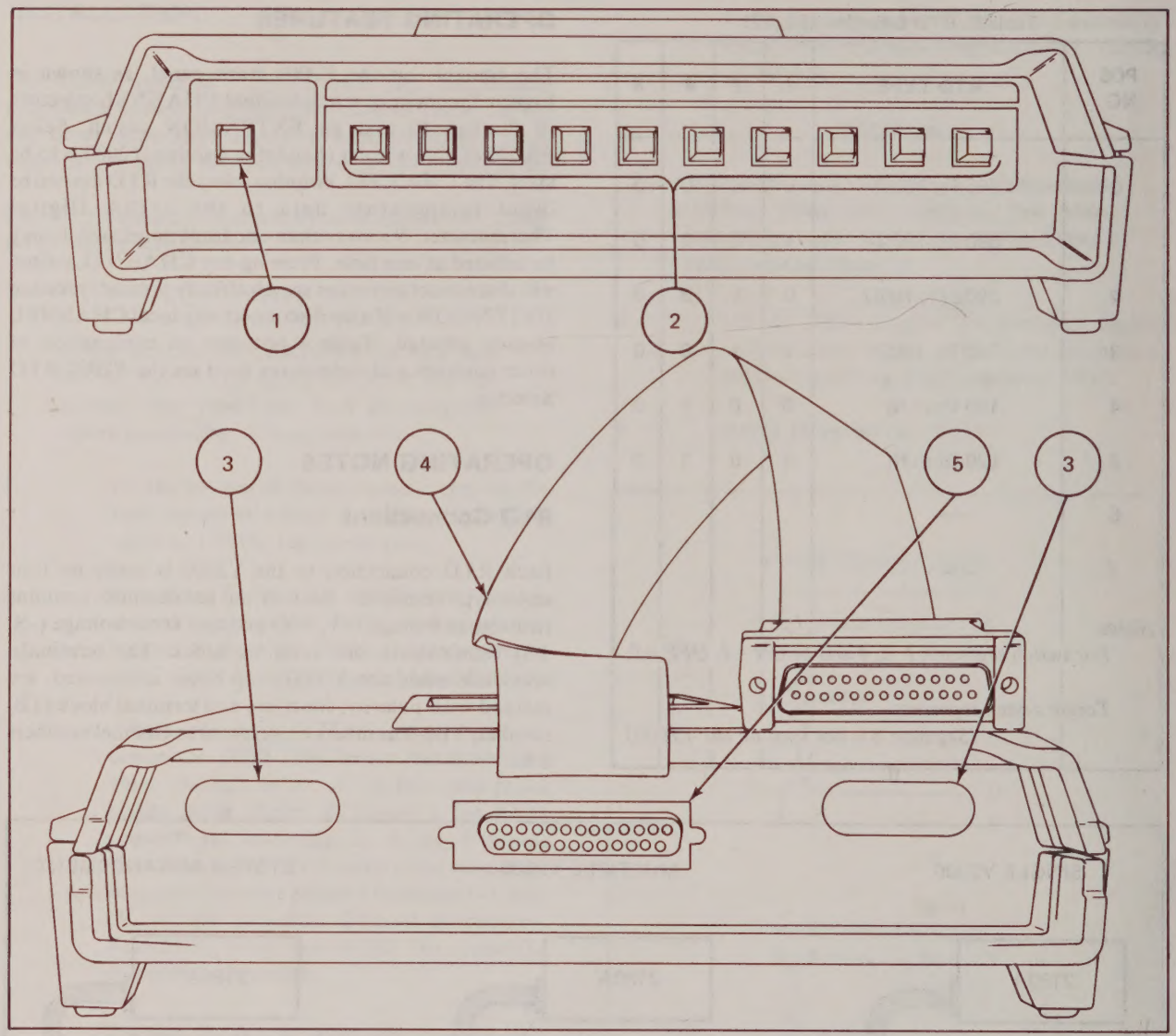


Figure 3. Controls and Connectors

Table 4. Controls and Connectors

REF NO.	NAME	FUNCTION
1	EXTENSION	Out when channels 0–9 of the same Y2000 are in use. In when another Y2000 in series is in use.
2	CHANNEL Selectors	Push in to select RTD attached to that channel as input to 2180A Digital Thermometer. Only one switch can be used at a time.
3	Access Ports	Route connecting wires from RTD probes to terminal block connectors in the Y2000.
4	Accessory Bus Cable and Plug	Flexible cable attaches to ACCESSORY CONNECTOR on a preceding unit (2180A or another accessory).
5	Accessory Bus Connector	Accepts Accessory Bus Cable from a preceding accessory.

RTD Type Selection

Two RTD types at a time can be used with the Y2000. Inputs to channels 0-4 are grouped together in a row of terminal blocks (TB0-TB4). RTD type selection for this grouping is controlled by S2. Channels 5-9 are similarly controlled by S1. All inputs within a channel grouping must be from the same type RTD.

To select the RTD type for a channel grouping, refer to Table 3 and toggle appropriate segments of S1 (channels 5-9) or S2 (channels 0-4). The four BCD coded segments for either switch may be toggled ON as necessary to select the position number desired.

Channel Identification

When the 2180A Digital Thermometer is equipped with the Output Option (-002), it will be necessary to identify the selected channel to the remote printer (or other display device) in use. The least significant digit (0-9) of such an identification will be supplied by the CHANNEL switch selected on the Y2000. If more than one Y2000 (through a maximum of ten) is employed, it will also be necessary to provide a most significant digit (MSD) unique to each RTD Multipoint Selector. Provision for Y2000 MSD designation is made through the physical removal of diodes on the Y2000's Main PCB. These diodes, CR1-CR4, allow for BCD coding 0-9 as Y2000 identifiers. Remove appropriate diodes as follows:

CR1	for a count of:	8X
CR2		4X
CR3		2X
CR4		1X

For example, if the fifth Y2000 in a chain is to be identified, clip out diodes CR2 and CR4 (4 + 1 = 5). Diodes CR1-CR4 will be found grouped in the right rear corner of the Main PCB.

Accessory Bus Connections

The Y2000 provides two bus connections. The first, a 25-pin connector mounted in the center of the rear panel, allows for accessory bus linkage with a succeeding unit. The second, a 25-wire flat cable with connector, attaches to the 2180A Digital Thermometer or to another previous instrument in the series.

Multiple RTD Selectors

A single 2180A Digital Thermometer can scan a maximum of 100 channels. Refer to Figure 2 when connecting one or more Y2000's to the 2180A or Y2002.

CAUTION

RTD probe leads should be isolated from any voltage source by at least 100 megohms.

OPERATING DIRECTIONS

Operate the Y2000 RTD Multipoint Selector using the following procedure:

1. Verify that the Y2000 has been properly installed in the system.
2. If necessary, adjust the nulling resistor(s) (see CALIBRATION) to compensate for RTD lead resistance.
3. Verify that proper RTD type selection (S1 or S2) and connections (TB0-TB9) have been made.
4. With the top case half reinstalled on the Y2000, energize the 2180A Digital Thermometer.
5. Install the RTD probe(s) into the operating environment.

NOTE

If more than one Y2000 is installed in series, verify that the EXTENSION switch is depressed on all units except the one to which the desired RTD is attached.

6. Select the desired RTD channel.
7. Monitor the RTD output on the 2180A Digital Thermometer. Allow 20 minutes for the displayed reading to stabilize.

THEORY OF OPERATION

The Y2000 is a manually-switched, 10 channel selection device. Voltage levels measured across one of ten resistive temperature devices (RTD's) may be selected as an input to the 2180A Digital Thermometer. Circuitry for the Y2000 Multipoint Selector consists of analog and digital sections. Refer to Figure 4 during the following circuit descriptions.

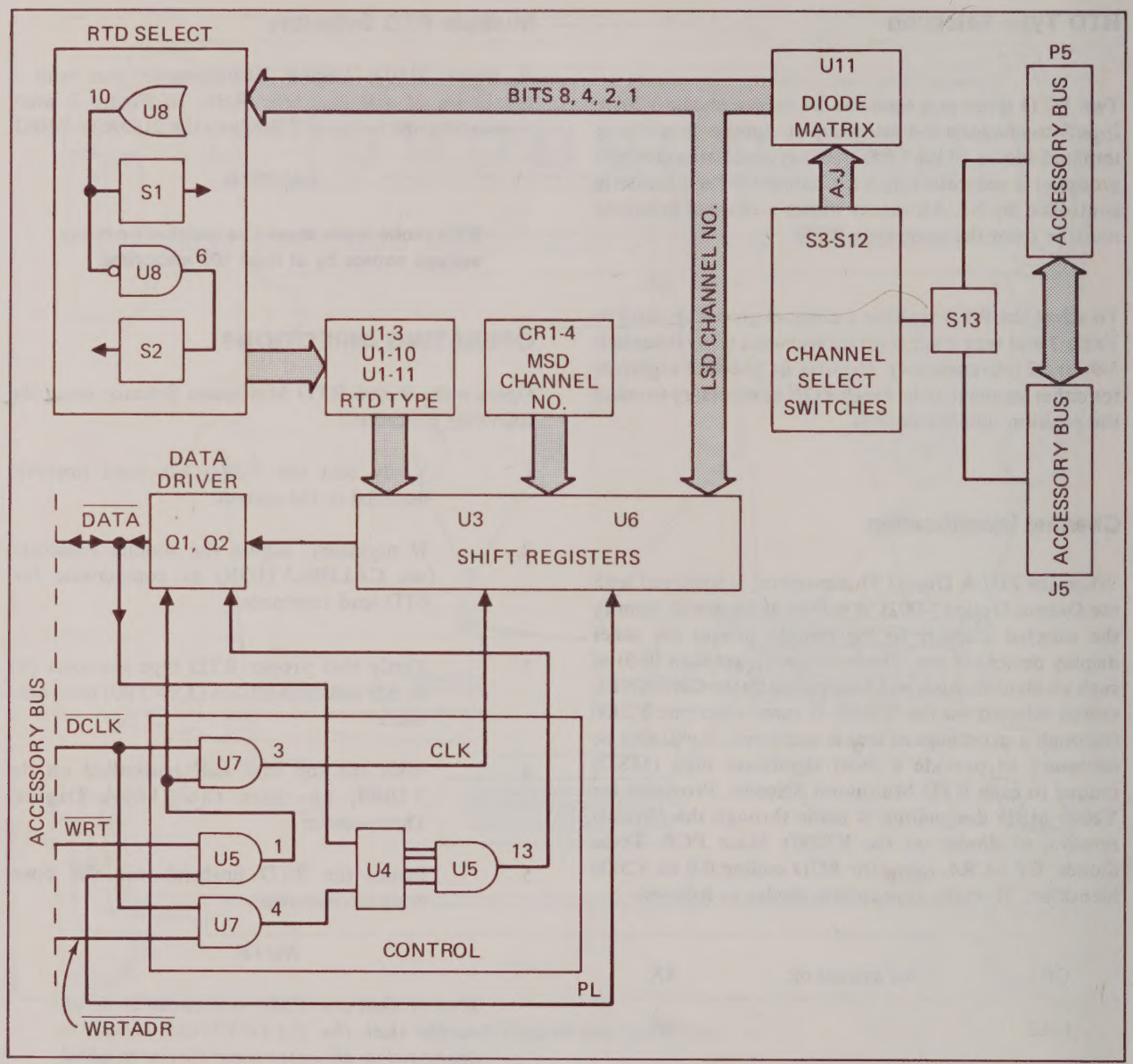


Figure 4. Simplified Schematic

Analog Section

Analog circuits in the Y2000 comprise the following areas:

1. Ten manual CHANNEL selection switches. One RTD channel at a time may be selected for monitoring by the 2180A Digital Thermometer.
2. An EXTENSION switch to enable channel selection on another attached Y2000.
3. Individual terminal blocks for each channel's connections.

In the switching section, ten 4-pole, double throw pushbutton switches provide individual channel selection. Use of the EXTENSION switch, or of any CHANNEL switch, will disconnect any other switch already in use. Channel selection involves connecting +Source, and + and –Sense lines to P5. A nulling pot associated with the positive source voltage for each RTD channel can be used to adjust the source resistance. Compensation can thus be made for varying RTD lead resistance. Guarding is used in the Y2000 to insure RTD voltage level integrity.

The EXTENSION switch when deactivated (out), connects four lines from the 2180A (+S, –S, +V, $\overline{\text{DATA}}$) to the Y2000's CHANNEL selection switches and circuitry. When activated (in), this switch connects the four lines to another Y2000 through the accessory bus.

Digital Section

The thermometer must address the RTD Selector on the accessory bus ($\overline{\text{DATA}}$ line) prior to any communications. This address will be clocked into shift register U4 when $\overline{\text{WRT ADR}}$ is low and the repetitive $\overline{\text{DCLK}}$ pulse is applied to U7-4. A decoded four-bit address at U5-13 (low) enables one input to data output gate U8-9.

Two other inputs to U8-9 are necessary to obtain data output. First, after the RTD Multipoint Selector has been addressed, $\overline{\text{WRT ADR}}$ and $\overline{\text{WRT}}$ will go high. The subsequent low at U5-1 enables U7-1 and U8-1. Second, U7-3 toggles with the $\overline{\text{DCLK}}$ pulse; data is thereby transferred from shift registers U3 and U6, enabling U8-8 and outputting to the $\overline{\text{DATA}}$ line for transfer to the thermometer.

The two digit channel number is used in two ways. The Least Significant Digit (LSD), as determined by the front panel CHANNEL select switches, is loaded into shift register U6 at pins 4, 5, 6, and 7. The LSD channel number information will also determine logic levels applied to the RTD type select switches (S1 and S2). Three-bit program data, decoded from the type select switch settings, will then be applied to U3, pins 5, 6, and 7 and clocked out to the 2180A Digital Thermometer via the accessory bus. This data will set the 2180A microcomputer program to properly linearize the selected RTD's non-linear response.

Specifically, a high at U8-10, whenever channel 0, 1, 2, 3, or 4 is selected, will be inverted by U8-6 and applied as a low to S2. Applicable settings of S2 (bit 4, 2, or 1) can now pull one input low to any or all of the decoders U1-11, U1-10, or U1-3. These inputs, inverted, then load the three-bit RTD type into shift register U3.

When channel 5, 6, 7, 8, or 9 is selected, U8-10 will be low. Type selector S2 will no longer be able to pull decoder inputs low. S1 will now load U3 in the same manner as did S2. The Most Significant Digit (MSD), as determined by the arrangement of CR1-4, is loaded into U6 at pins 1, 15, 14, and 13.

PERFORMANCE TEST

CAUTION

Avoid shorting across electrical conductors during the PERFORMANCE TEST, CALIBRATION, and TROUBLESHOOTING. Damage to circuitry in the Y2000 or the 2180A could otherwise result.

The performance test verifies instrument performance and may be used for initial acceptance, or as an aid in troubleshooting. If the RTD Multipoint Selector fails to pass this test, the troubleshooting should be performed by qualified service personnel.

The test equipment required for the Performance Test is listed in Table 5. If the recommended equipment is not available, replacements with equivalent specifications may be substituted. Refer to Figure 5 for recommended equipment connections.

If the instrument does not meet specifications listed in the Performance Test, calibration or corrective maintenance should be performed. The test should be performed when the ambient temperature is between 23° C and 27° C, and the relative humidity less than 80% to attain maximum accuracy.

Use the following procedure for the Performance Test:

1. On the 2180A, turn the POWER switch OFF.
2. Insure the RTD Input Module select switch (2180A) is set to 0 (all segments OFF).
3. With the Y2000's top cover removed:
   - Position RTD switch S2 to 0.
   - Referring to Figure 5, connect decade resistance box wires to TB0.
   - Select CHANNEL 0.
   - Connect the Accessory Bus Cable to ACCESSORY CONNECTOR on the 2180A.
4. Press POWER ON (2180A).
5. On the Decade Resistance Box, select the resistance listed in Table 6 for the RTD type (0-5). Verify that the 2180A reading matches that presented in the Table.
6. On the Y2000, position switch S2 to 1 (segment 1 ON). Repeat step 5.
7. Repeat step 6 with S2 set successively for positions 2, 3, 4, and 5.
8. On the Y2000, press EXTENSION. Verify that the 2180A reading flashes for overrange. Press EXTENSION off.
9. On the 2180A, press power OFF.
10. Connect the Decade Resistance Box wires to TB5 on the Y2000 and select CHANNEL 5.
11. Set S1 for 0. Repeat steps 4-7, this time using S1.

Table 5. Y2000 Test Equipment

TEST EQUIPMENT	MIN. USE SPECS.	RECOMMENDED MODEL
Decade Resistance Box	.01% or .01° resolution	Gen. Radio 1433-T or equivalent
Digital Thermometer	Performance Test verified and calibrated	Fluke 2180A
Lag Bath with Thermometer	Insulated, unbreakable liner, provide .01° resolution	Customer Constructed

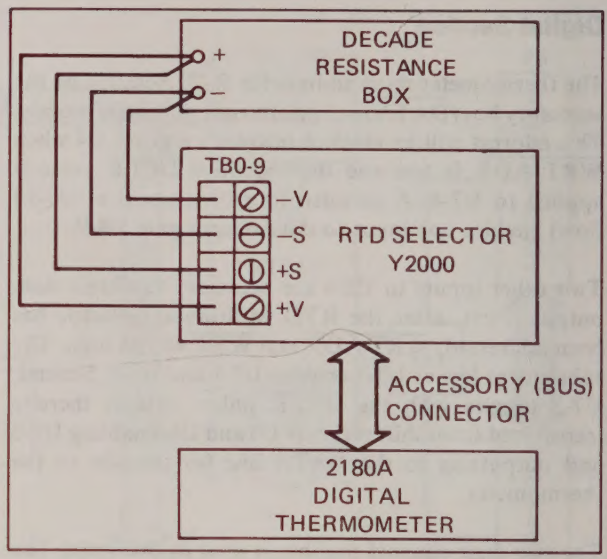


Figure 5. Performance Test

Table 6. Performance Test

SET Ω	RTD	READING		TOLERANCE			
				90 DAY		1 YEAR	
		°F	°C	°F	°C	°F	°C
10.41	(0)	–364.00	–220.00	0.097	0.056	0.106	0.061
175.84		392.00	200.00	0.102	0.052	0.111	0.057
294.16		1004.0	540.0	0.336	0.199	0.360	0.211
368.12		1427.0	775.0	0.409	0.237	0.111	0.255
38.85	(1)	–238.00	–150.00	0.196	0.119	0.202	0.122
213.41		572.0	300.0	0.265	0.164	0.277	0.169
248.83		752.0	400.0	0.294	0.177	0.311	0.186
347.90		1292.0	700.0	0.385	0.224	0.417	0.240
23.88	(2)	–300.0	–184.44	0.086	0.050	0.093	0.054
66.07		–120.00	–84.44	0.058	0.034	0.061	0.035
170.23		360.00	182.2	0.097	0.150	0.105	0.153
258.32		800.0	426.7	0.302	0.181	0.320	0.190
328.7		1180.0	637.8	0.366	0.214	0.344	0.229
25.06	(3)	–295.00	–181.67	0.191	0.049	0.198	0.053
139.20		212.00	100.00	0.177	0.036	0.182	0.038
297.05		1000.0	537.8	0.335	0.198	0.359	0.210
337.11		1220.0	660.0	0.373	0.218	0.402	0.233
71.80	(4)	–67.00	–55.00	0.172	0.105	0.173	0.106
154.90		194.01	90.00	0.213	0.143	0.216	0.144
161.70		212.0	100.0	0.215	0.144	0.218	0.145
219.00		347.0	175.0	0.213	0.150	0.238	0.152
81.77	(5)	–70.00	–56.67	0.172	0.105	0.173	0.108
189.66		190.01	87.78	0.213	0.209	0.216	0.111
271.16		340.01	171.15	0.236	0.149	0.237	0.152

CALIBRATION

Nulling resistor (R4-R13) adjustments compensate for RTD lead resistance. The resistor associated with a channel in use should be adjusted under the following circumstances:

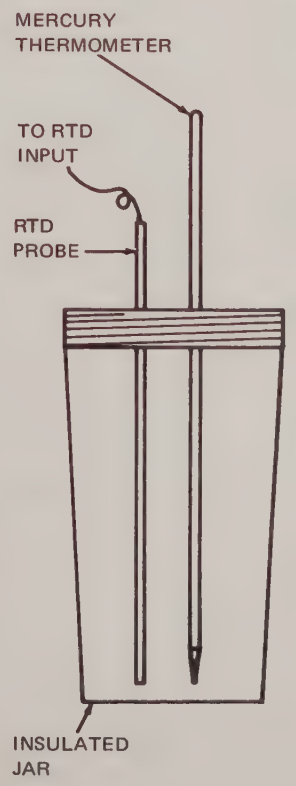
1. Whenever an RTD probe for the associated channel is changed.
2. Whenever the associated 2180A Digital Thermometer is repaired on calibrated.
3. Whenever the associated Y2000 is repaired.

The following calibration procedures are to be made with the Y2000 properly connected to a calibrated 2180A Digital Thermometer.

1. Attach the lines from an RTD probe (installed in a lag bath) to the terminal block of the channel to be checked. Terminal block numbers directly correspond to channel numbers. Refer to Table 1 when making RTD connections to the terminal block. Consult instructions provided with the RTD for specific installation directions. Table 7 provides a recommended lag bath construction technique.
2. Position the RTD select switch for the RTD type connected to the channel group in use (S2 for channels 0-4, S1 for channels 5-9).
3. On the 2180A, press power CN and allow the system to stabilize at a displayed temperature (20 minutes).
4. If necessary, adjust the nulling resistor (R4-R13) for the selected channel on the Y2000. Continue adjustment until the temperature read on the 2180A equals the temperature of the lag bath thermometer. Nulling resistor positioning on the Y2000 pcb corresponds to terminal block positioning; for example, R11 will adjust for TB2.
5. Repeat steps 1-4 for each channel and RTD to be calibrated.

Table 7. Lag Bath Construction

STEP	ACTION
1	Required materials include: — any RTD probe acceptable to the 2180A Digital Thermometer. — a mercury thermometer (.01° resolution). Princo Model ASTM 116C or equivalent for room temperatures (18.9° to 25.1°C). — insulated jar (unbreakable inner envelope). Thermos or equivalent.
2	Drill two holes in the insulated jar's lid (or in some other suitable fitting). These holes should be just large enough to accept the mercury thermometer and the RTD probe.
3	With the jar containing water at room temperature, attach the lid, with RTD and mercury thermometer installed. The RTD should be immersed as far as possible without touching bottom. The mercury thermometer should be immersed to the same water depth as the RTD.
4	Allow the temperature displayed on the digital thermometer to stabilize (usually 20 minutes).
5	Perform calibration.



TROUBLESHOOTING

Troubleshooting for the Y2000 consists of the flow chart in Table 8. When a step on the chart is completed, check for a decision transfer (YES or NO). If no decision is required, perform the next step of the table in sequence.

⊘ Static discharge can damage components contained in the Y2000. The following precautions should be observed when conducting adjustments or repairs with the instrument's top cover removed.

1. Never conduct repairs without first disconnecting the ACCESSORY CABLE and the ACCESSORY CONNECTOR.

2. Perform all repairs at a static - free work station.

3. Minimize handling of IC's and the pcb; in no case handle them by their connectors.

4. Keep repair parts in their original containers until ready for use.

5. Use static ground straps to discharge repair personnel.

6. Use conductive foam or anti-static containers to store replacement or removed IC's.

7. Remove all plastic, vinyl and styrafoam products from the work area.

8. Do not slide static sensitive devices over any surface.

9. Use only anti-static type solder removal tools.

10. Use grounded tip soldering irons.

PARTS LIST

A detailed parts breakdown for the Y2000 is presented in Table 9. Refer to Figure 6 (Final Assembly) and Figure 7 (PCB Assembly) when referencing parts locations.

Table 8. Troubleshooting

STEP NO.	ACTION	Go to the step number given for correct response	
		YES	NO
	NOTE *The following troubleshooting procedures for the Y2000 depend on the 2180A Digital Thermometer having been thoroughly checked out and determined to be free of problems.*		
1	Connect the Y2000 to the 2180A with the accessory bus cable. Select channel 0 on the RTD Selector (Y2000); insure that the RTD Input Module (2180A) selector switch is set to 0. Attach a 100 ohm resistor (4-wire connections) to TB0 (Y2000). Apply power to the 2180A.		
2	Does the 2180A display read approximately 32°F (0° C)?	23	3
3	Check voltages on the RTD Selector: +5V in reference to digital common, +15V in reference to analog common. Check the same voltages on the 2180A, with the Y2000 disconnected (to check for loading). Repair as required and resume at step 1.		
4	In turn select each channel on the Y2000 and apply a 100 4-wire resistor to the selected input terminals.		
5	Does the 2180A display read approximately 32°F (0°C) for each channel?	7	6
6	Check the switch contacts potentiometers R8-R13 and connections. Repair as required; resume at step 4.		
7	Do the $\overline{\text{DATA}}$, $\overline{\text{DCLK}}$, $\overline{\text{WRTADR}}$, and $\overline{\text{WRT}}$ toggle (vary between logic high and logic low)? View these lines with a scope grounded at digital common.	9	8
8	Check the defective lines for bad cable and/or connectors, and for loading. Repair as required; resume at step 7.		
9	Is +5V present between pins 14 and 7 (low) of U1, U5, U7, U8, and U10 between pins 16 and 8 (low) of U3, U4 and U6; and from digital common to U2-1?	11	12
10	Check the land pattern to the affected IC. Repair as required; resume at step 9.		
11	Is the signal at U10-6 and U8-9 toggling (opposite polarity)?	23	12
12	Is the signal at U8-1 toggling?	14	13
13	Check U5-1 and its inputs. Repair as required; resume at step 11.		
14	Is the signal at U8-2 toggling?	16	15
15	Check U5-13 and its inputs from U7; check for toggling data at U4-7 and clock at U4-9 and their inputs. Repair as required; resume at step 11.		
16	Is the signal at U8-8 toggling?	22	17
17	Is the signal at U7-3 toggling?	19	18
18	Check U7-3 and its inputs. Repair as required; resume at step 11.		
19	Is the signal at U10-2 toggling?	21	20
20	Check U10-2 and its input. Repair as required; resume at step 11.		

Table 8. Troubleshooting (cont)

STEP NO.	ACTION	Go to the step number given for correct response	
		YES	NO
21	Check U10-4 and U3. U4 and their inputs. Repair as required; resume at step 11.		
22	Check U8-9, U10-6, Q1, Q2 and their associated components. Repair as required; resume at step 11.		
23	Attach any allowable type RTD to the channel 0 input connectors and select channel 0.		
24	Rotate the Y2000 RTD type select switch for bank 1 (channels 0-4) through its range. The 2180A display should read the ambient temperature for the RTD type connected, be zero for types not included in the program and a different figure for each of the other four types selectable. *NOTE* *The above step tests for switch operation only. The display for RTD types other than the one installed will be only approximations.*		
25	Connect the RTD to a channel in bank 2 (channels 5-9); select that channel and position the RTD type select switch through the RTD types, observing the display.		
26	Is the display as stated through the range of both RTD type select switches?	31	27
27	Check that U8-10 changes states when channel selection changes from one bank to the other. Check that U3-6 is of the opposite polarity and changes states at the same time.		
28	Are the signals correct at U8-10 and U8-6?	30	29
29	Check U8, U7, U10, U11 and its inputs from the channel selection switches, and their associated components. Repair as required; resume at step 23.		
30	Check U1 and the RTD type select switches S1 and S2. Repair as required; resume at step 23.	32	35
31	Is the 2180A equipped with an Output Option –002?		
32	Obtain a printed output from the 2180A with channel selected in the Y2000.		
33	Is the channel number printed correctly?	35	34
34	If the channel LSD is incorrect, check U6 and U11 including inputs from the channel selector switches. If the MSD is incorrect, check U6 and the diode array (CR1, CR2, CR3, CR4). Repair as required; resume at step 32.		
35	Troubleshooting of the Y2000 RTD selector is complete.		

Table 9. Y2000 RTD Multipoint Selector, Final Assembly

ITEM NO.	DESCRIPTION	FLUKE STOCK NO.	MFG SPLY CODE	MFG PART NO. OR TYPE	TOT QTY	REC QTY	USE CDE
	FINAL ASSY (2180A-4230)						
A1	Ⓟ RTD MLPT SELECTOR ASSY (2180A-4030T)	469353	89536	469353	1		
H1	SCREW, 6-20 X 3/8	288266	89536	288266	1		
H2	GROMMET	380782	77969	68	2		
H3	SCREW, FPH, 6-32 X 9/16	484790	89536	484790	2		
MP1	BASE, STD	454702	89536	454702	1		
MP2	GUARD, BASE	464404	89536	464404	1		
MP3	REAR PANEL	464180	89536	464180	1		
MP4	LATCH	467548	89536	467548	2		
MP5	BAIL	467555	89536	467555	1		
MP6	FOOT, NON-SKID	467571	89536	467571	4		
MP7	FRONT PANEL	475293	89536	475293	1		
MP8	DECAL, FRONT PANEL	454660	89536	454660	1		
MP9	DECAL, BOTTOM	473900	89536	473900	1		
MP10	DECAL, BASE SIDES	473652	89536	473652	2		
MP11	COVER, SIZE A	454710	89536	454710	1		
MP12	GUARD, COVER A	464198	89536	464198	1		
MP13	RETAINER, HANDLE	467563	89536	467563	2		
MP14	DECAL, RETAINER	473645	89536	473645	2		
MP15	HANDLE	454751	89536	454751	1		
MP16	INSULATOR, GUARD COVER	488387	89536	488387	1		

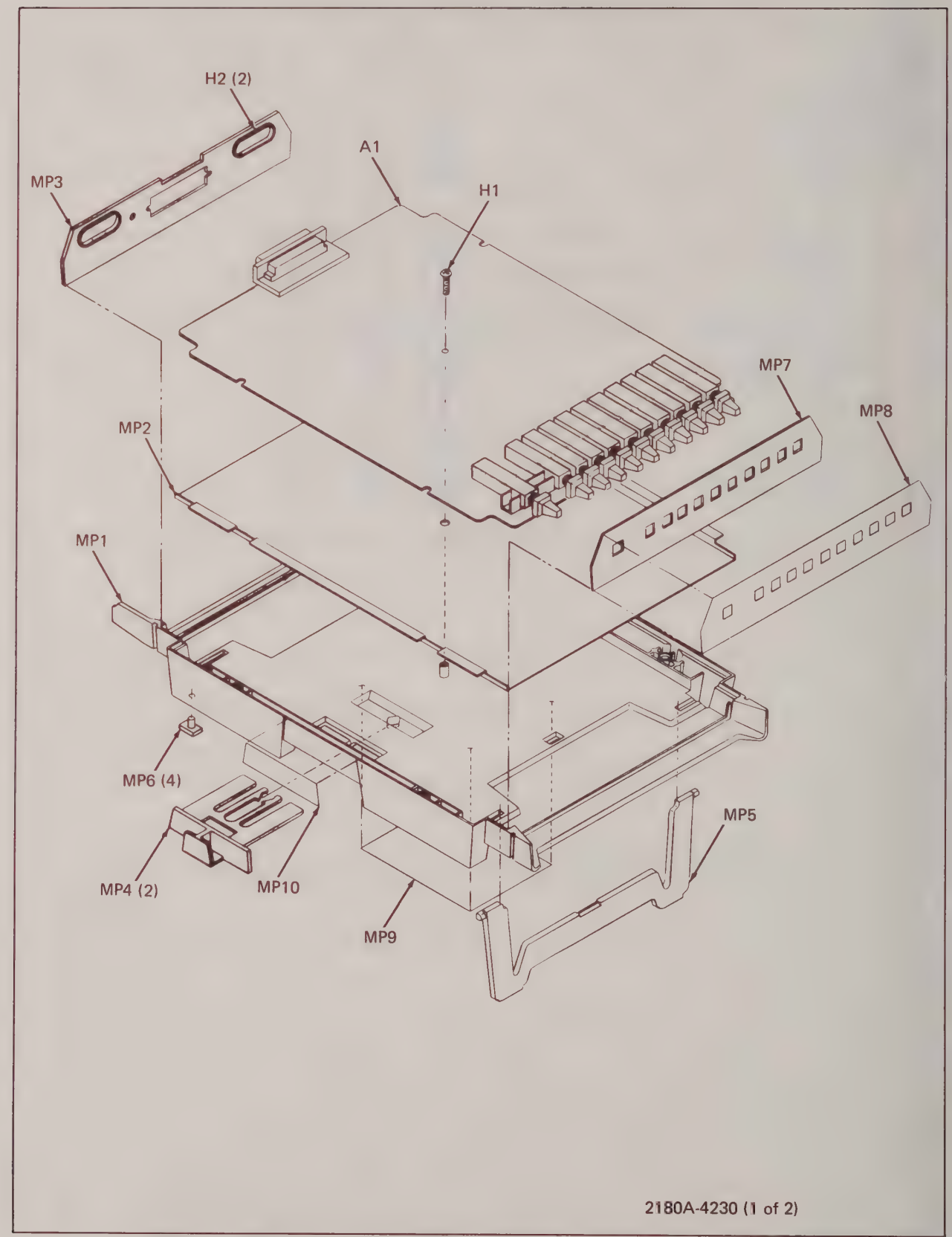
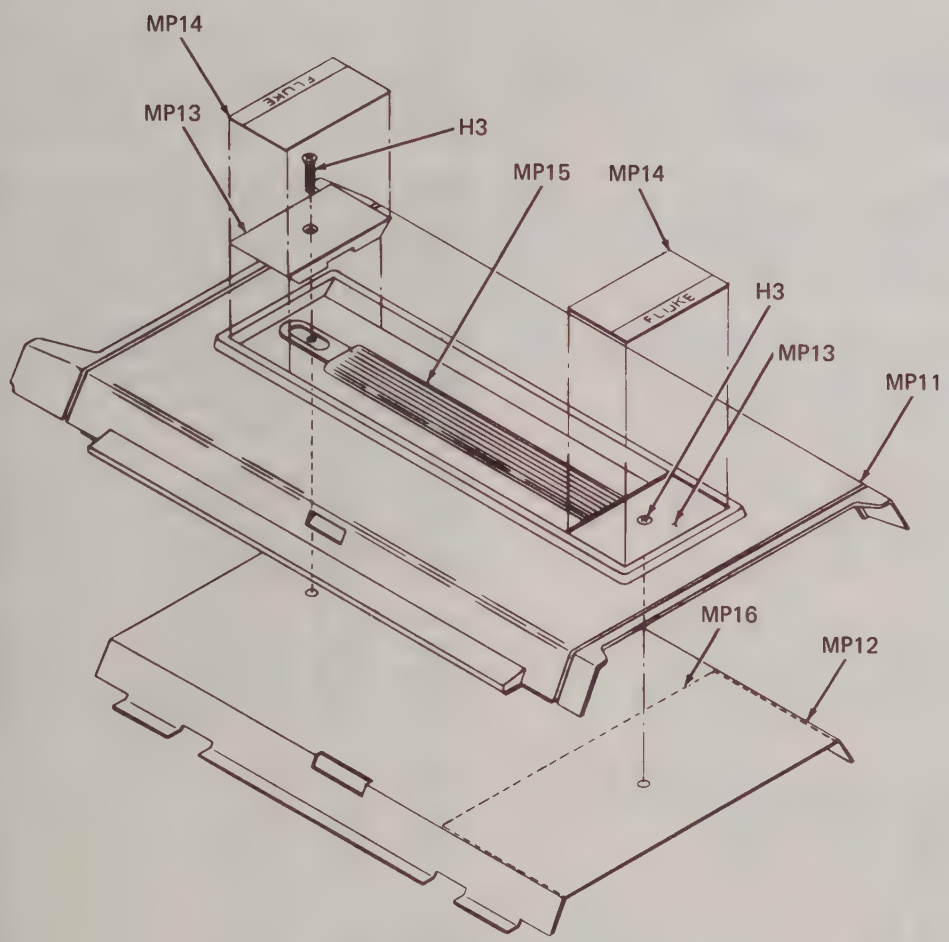


Figure 6. Y2000 RTD Multipoint Selector, Final Assembly



2180A-4230 (2 of 2)

Figure 6. Y2000 RTD Multipoint Selector, Final Assembly (cont)

Table 10. A1 RTD Multipoint Selector PCB Assembly

ITEM NO.	DESCRIPTION	FLUKE STOCK NO.	MFG SPLY CODE	MFG PART NO. OR TYPE	TOT QTY	REC QTY	USE CDE
A1	Ⓐ RTD MLPT SELECTOR ASSY (2180A-4030)						
CR1	DIODE, HI SPEED SWITCHING	203323	07910	IN4448	4	1	
CR2	DIODE, HI SPEED SWITCHING	203323	07910	IN4448	REF		
CR3	DIODE, HI SPEED SWITCHING	203323	07910	IN4448	REF		
CR4	DIODE, HI SPEED SWITCHING	203323	07910	IN4448	REF		
H1	LOCK WASHER	110395	89536	110395	2		
H2	PRESSNUT, 4-40	380196	24347	KF2-440	2		
H3	SCREW, PHP, 4-40 X 3/8	152124	73734	19024	2		
H4	WASHER FLAT	147728	73734	1402	2		
J5	CONNECTOR, SUB-MINI	461996	00779	206584-1	1		
MP1	SPACER	285353	71590	J64284	5		
MP2	PUSHBUTTON, DK PUTTY GRAY	426759	89536	426759	10		
MP3	PUSHBUTTON, LT. PUTTY GRAY	425900	89536	425900	1		
Q1	TRANSISTOR, SI, PNP	195974	04713	2N3906	1	1	
Q2	TRANSISTOR, SI, NPN	218396	04713	2N3904	1	1	
R1	RES, DEP CAR, 10K +/-5%, 1/4W	348839	80031	CR251-4-5P10KT	5		
R2	RES, DEP CAR, 100K +/-5%, 1/4W	348920	80031	CR251-4-5P100KT	1		
R3	RES, DEP CAR, 10K +/-5%, 1/4W	348839	80031	CR251-4-5P10KT	REF		
R4	RES, VAR, 500 +/-20%, 1/2W	267849	75378	190PC501B	10	1	
R5	RES, VAR, 500 +/-20%, 1/2W	267849	75378	190PC501B	REF		
R6	RES, VAR, 500 +/-20%, 1/2W	267849	75378	190PC501B	REF		
R7	RES, VAR, 500 +/-20%, 1/2W	267849	75378	190PC501B	REF		
R8	RES, VAR, 500 +/-20%, 1/2W	267849	75378	190PC501B	REF		
R9	RES, VAR, 500 +/-20%, 1/2W	267849	75378	190PC501B	REF		
R10	RES, VAR, 500 +/-20%, 1/2W	267849	75378	190PC501B	REF		
R11	RES, VAR, 500 +/-20%, 1/2W	267849	75378	190PC501B	REF		
R12	RES, VAR, 500 +/-20%, 1/2W	267849	75378	190PC501B	REF		
R13	RES, VAR, 500 +/-20%, 1/2W	267849	75378	190PC501B	REF		
R14	RES, DEP CAR, 10K +/-5%, 1/4W	348839	80031	CR251-4-5P10KT	REF		
R15	RES, DEP CAR, 10K +/-5%, 1/4W	348839	80031	CR251-4-5P10KT	REF		
R16	RES, DEP CAR, 10K +/-5%, 1/4W	348839	80031	CR251-4-5P10KT	REF		
R17	RESISTOR, COMP, 47K +/-5%, 1/4W	110015	01121	HB4735	1		
S1	SWITCH, 10 POS. ROTARY	429357	89536	429357	2		
S2	SWITCH, 10 POS. ROTARY	429357	89536	429357	REF		
S3	SWITCH ASSY	473363	89536	473363	11		
S4	SWITCH ASSY	473363	89536	473363	REF		
S5	SWITCH ASSY	473363	89536	473363	REF		
S6	SWITCH ASSY	473363	89536	473363	REF		
S7	SWITCH ASSY	473363	89536	473363	REF		
S8	SWITCH ASSY	473363	89536	473363	REF		
S9	SWITCH ASSY	473363	89536	473363	REF		
S10	SWITCH ASSY	473363	89536	473363	REF		
S11	SWITCH ASSY	473363	89536	473363	REF		
S12	SWITCH ASSY	473363	89536	473363	REF		
S13	SWITCH ASSY	473363	89536	473363	REF		
TB0	TERMINAL BLOCK	461475	89536	461475	10		
TB1	TERMINAL BLOCK	461475	89536	461475	REF		
TB2	TERMINAL BLOCK	461475	89536	461475	REF		
TB3	TERMINAL BLOCK	461475	89536	461475	REF		
TB4	TERMINAL BLOCK	461475	89536	461475	REF		

Table 10. A1 RTD Multipoint Selector PCB Assembly (cont)

ITEM NO.	DESCRIPTION	FLUKE STOCK NO.	MFG SPLY CODE	MFG PART NO. OR TYPE	TOT QTY	REC QTY	USE CDE
TB5	TERMINAL BLOCK	461475	89536	461475	REF		
TB6	TERMINAL BLOCK	461475	89536	461475	REF		
TB7	TERMINAL BLOCK	461475	89536	461475	REF		
TB8	TERMINAL BLOCK	461475	89536	461475	REF		
TB9	TERMINAL BLOCK	461475	89536	461475	REF		
U1	⊗IC, CMOS, QUAD 2 INPUT NAND GATES	355198	04713	MC14011CP	1	1	
U2	RES NETWORK, SIP, 100K	412908	89536	412908	1	1	
U3	⊗IC, CMOS 8 STAGE STATIC SHIFT REGISTER	380766	02735	CD4021AE	2	1	
U4	⊗IC CMOS DUAL 4 BIT STATIC SHIFT REGISTER	340125	04713	MC14015BCP	1	1	
U5	⊗IC, CMOS DUAL 4 INPUT POS NAND GATE	355206	04713	MC14012CP	1	1	
U6	⊗IC, CMOS 8 STAGE STATIC SHIFT REGISTER	380766	02735	CD4021AE	REF		
U7	⊗IC, COS/MOS, QUAD 2 INPUT NOR GATES	355172	04713	MC14001CP	1	1	
U8	⊗IC, COS/MOS, TRIPLE 3 INPUT NOR GATES	355180	04713	MC14025CP	1	1	
U9	RES NETWORK, 100K	380618	89536	380618	1		
U10	⊗IC, CMOS HEX INVERTER	404681	04713	MC1406BCP	1		
U11	IC, DIODE MATRIX	370676	89536	370676	1		
W1	CABLE ASSY	473439	89536	473439	1		

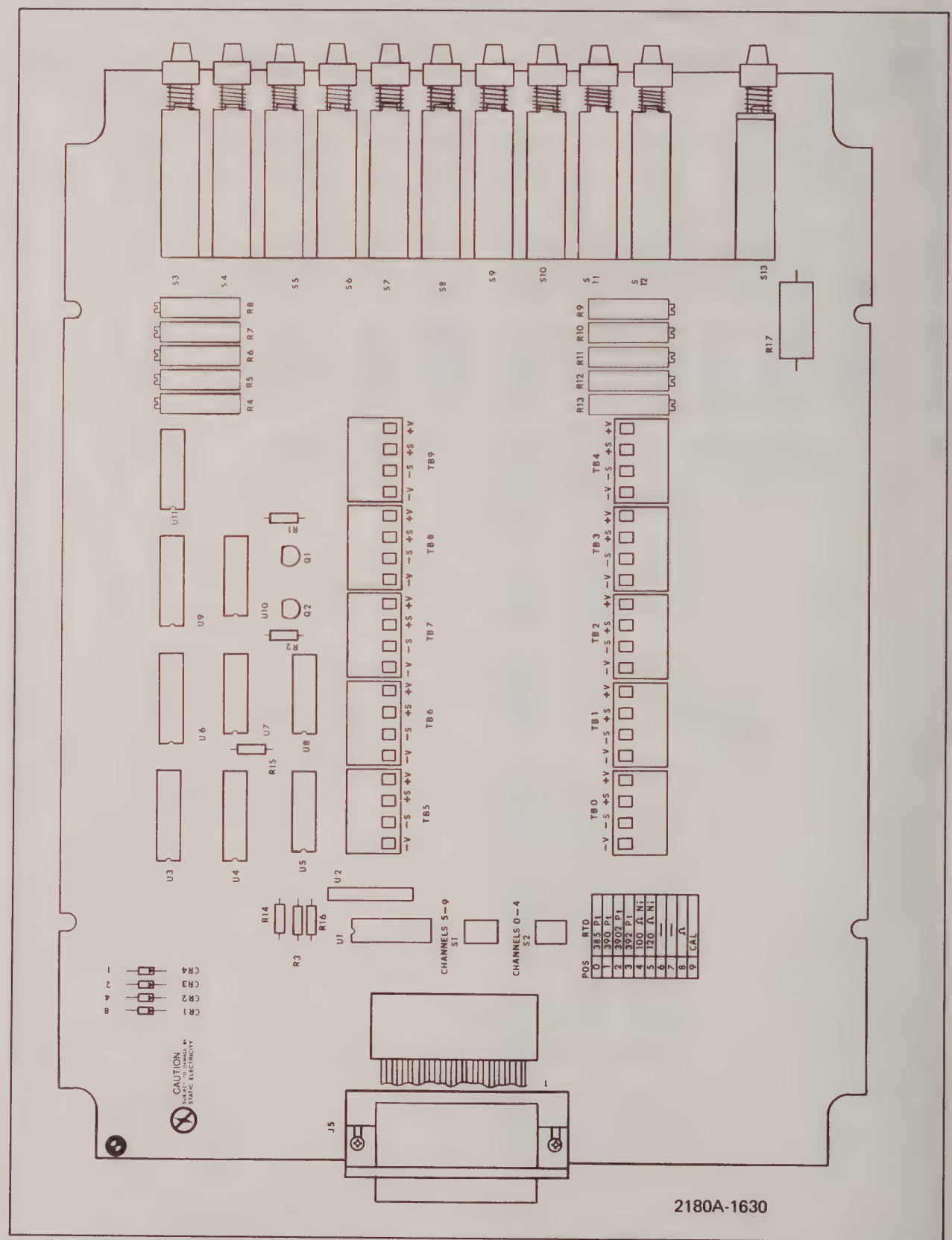


Figure 7. A1 RTD Multipoint Selector PCB Assembly

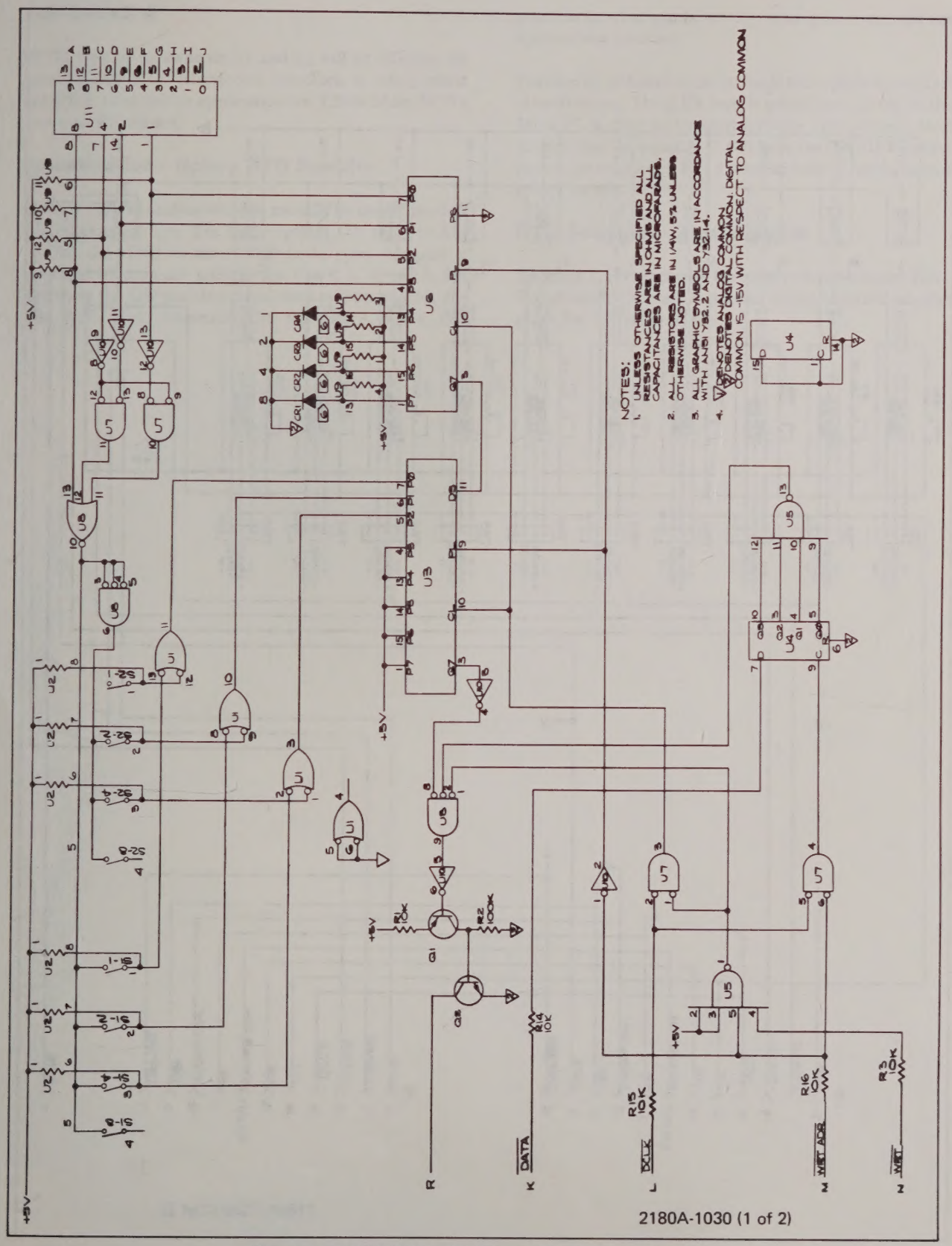

NOTES:
1. UNLESS OTHERWISE SPECIFIED ALL RESISTANCES ARE IN OHMS AND ALL CAPACITANCES ARE IN MICROFARADS.
2. ALL RESISTORS ARE IN 1/4W, 5% UNLESS OTHERWISE NOTED.
3. ALL GRAPHIC SYMBOLS ARE IN ACCORDANCE WITH ANSI Y32.2 AND Y32.14.
4. DENOTES ANALOG COMMON. DENOTES DIGITAL COMMON. DIGITAL COMMON IS -15V WITH RESPECT TO ANALOG COMMON
+5V
DATA
DCLK
WRT ADR
WRT
R15 10K
R16 10K
R3 10K
R14 10K
R1 10K
R2 100K
Q1
Q2
2180A-1030 (1 of 2)

Figure 7. A1 RTD Multipoint Selector PCB Assembly (cont)

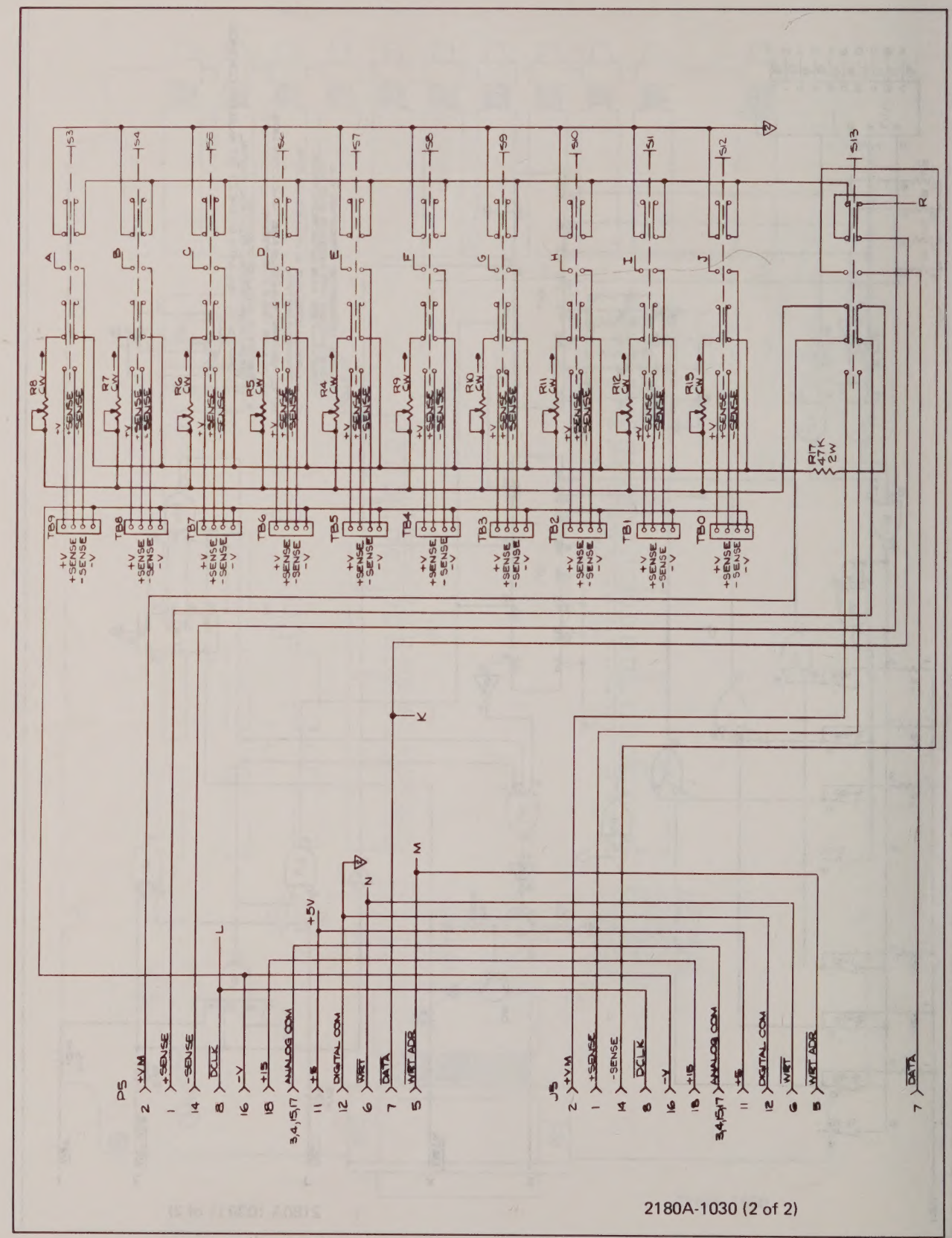


Figure 7. A1 RTD Multipoint Selector PCB Assembly (cont)

APPENDIX A

RTD type select switches S1 and S2 will be different on some Y2000 RTD Multipoint Selectors. A rotary select switch is used in this application on Y2000 Main PCB's prior to Revision C.

Identification - Rotary RTD Selector

Switch type identification can usually be made through visual examination. The four segment ON-OFF rocker switch described in the Y2000 Instruction Manual is denoted by separate settings for bits 1, 2, 4, and 8. Bit totals in the ON position equal the position number for the RTD type. Alternately for the rotary switch, this position number can be set by rotating the switch to the appropriate position.

Positive identification can be made through revision level identification. The REV level is printed on the top of the Main PCB, next to the part number. Any revision level greater than or equal to C will have the ON-OFF rocker switch arrangement. For example, level B would have a rotary switch.

RTD Selection - Rotary Switch

To select RTD types with the rotary switch, refer to Table 3 and rotate the switch pointer to the position number given for the RTD in use.

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